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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,305	01/23/2004	Jin Ping Liu	CS03-054	6526

7590 01/14/2005
STEPHEN B. ACKERMAN
28 DAVIS AVENUE
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EXAMINER

SARKAR, ASOK K

ART UNIT PAPER NUMBER

2829

DATE MAILED: 01/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/763,305	LIU ET AL.	
	Examiner	Art Unit	
	Asok K. Sarkar	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1 – 25 rejected under 35 U. S.C. 102(e) as being unpatentable for reasons of record in Office Action mailed August 23, 2004 is reproduced below:

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 – 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Leitz, US 2004/0087117.

Regarding claims 1 – 3, 5, 7, 9, 13, 15, 16 and 19, Leitz teaches a method of forming a strain relaxed silicon – germanium semiconductor alloy layer, comprising the steps of:

- providing a silicon semiconductor substrate 100 (see Fig. 1) in paragraph 55;
- growing a graded silicon - germanium semiconductor alloy layer 420 wherein the content of a germanium component in said graded silicon germanium layer is decreased as the growth of said graded, first silicon - germanium semiconductor alloy layer progresses with reference to Fig. 4 in paragraph 85;
- growing a relaxed silicon - germanium layer 450 on said graded silicon -

germanium layer, in situ in same apparatus used for growth of said graded silicon – germanium layer in paragraphs 56 - 59, and wherein the content of germanium component in said relaxed silicon - germanium layer is uniform with reference to Fig. 4 in paragraphs 63 and 85; and

- forming a silicon layer 170 (Fig. 1) on said relaxed silicon - germanium layer, in situ in said apparatus, and wherein said silicon layer is comprised with tensile strain in paragraph 66.

Regarding claims 4, 6, 10, 17, 18 and 22, Leitz teaches forming the graded and relaxed silicon – germanium semiconductor alloy layer by using silane and germane via LPCVD process and a thickness between 300 – 1000 Angstroms in paragraphs 56 and 73.

Regarding claims 8 and 20, Leitz teaches forming the graded relaxed silicon – germanium semiconductor alloy layer with Ge wt% between 50 – 0 according to Fig. 4.

Regarding claims 11 and 21, Leitz teaches forming the relaxed silicon – germanium semiconductor alloy layer via LPCVD in paragraphs 56 – 58 and a thickness between 2000 – 10,000 Angstroms in paragraph 63.

Regarding claims 12 and 23, Leitz teaches forming the relaxed silicon – germanium semiconductor alloy layer contains 20 – 100 wt% Ge in paragraph 63.

Regarding claims 14, 24 and 25, Leitz teaches forming the silicon semiconductor layer via LPCVD using silane in paragraphs 56 – 58 and a thickness between 100 – 200 Angstroms in paragraph 67.

Response to Arguments

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4. Applicant's arguments filed November 26, 2004 have been fully considered but they are not persuasive. The Applicant's representative argues in the second paragraph of page 9 that the Applicant has clearly shown in independent claims 1 and 15, a graded semiconductor alloy layer comprised with a germanium component in which the content of the germanium component in the graded semiconductor alloy layer is greatest at the semiconductor alloy layer - underlying substrate interface, with germanium content decreasing during growth of the graded semiconductor alloy layer thus resulting in the lowest germanium content at the top surface of the graded semiconductor alloy layer. This unique graded layer results in the largest mismatch at the semiconductor substrate – graded semiconductor alloy interface which will ultimately allow a non-graded overlying silicon – germanium layer to be grown in a relaxed form, while burying the unwanted threading dislocations near the graded semiconductor alloy layer - semiconductor substrate interface. In direct contrast the Leitz presents a graded semiconductor alloy layer in which the Lowest germanium content is at the semiconductor alloy layer - semiconductor substrate while the highest germanium content is located at the top surface of this layer. This unwanted grading profile leaves threading dislocations near a subsequently grown relaxed, non-graded semiconductor alloy. The germanium doping configuration in Leitz prior art will present greater risk of unwanted dislocations in any overlying semiconductor layer. Therefore, it is strongly believed that Applicant's process for the graded semiconductor alloy layer, uniquely different from Leitz obtained via a different growth procedure, clearly shows the needed process differentiation from the prior art.

The Examiner points out that Leitz applies a similar approach to grading profile in order to control the growth of unwanted threading dislocations near a subsequently grown relaxed, non-graded semiconductor alloy (layer 450) by growing a graded silicon – germanium semiconductor alloy layer 420 wherein the content of a germanium component in the graded silicon germanium layer is decreased as the growth of the graded, silicon - germanium semiconductor alloy layer progresses with reference to Fig. 4 in paragraph 85. Thus, Leitz's process for forming the graded semiconductor layer is not different from that of the Applicant.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on 571 272 2034. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Asok Kumar Sarkar

Asok K. Sarkar
January 3, 2005

Patent Examiner

Evan Pert

**EVAN PERT
PRIMARY EXAMINER**